Beach Morphology using Ground Penetrating Radar

Harry M. Jol, Department of Geography, University of Wisconsin - Eau Claire, 105 Garfield Ave., Eau Claire, WI; 54702, USA., jolhm@uwedc.edu

Curt Peterson, Department of Geology, Portland State University, PO Box 751, Portland, OR, 97297-0751, USA, curt@ch1.ch.pdx.edu

Peter Ruggerio, Washington Department of Ecology, P.O. Box 47690, Olympia, WA, 98504-7690, USA, prug461@ecy.wa.gov

Sandy Vanderburgh, Department of Geography, University-College of the Fraser Valley, Abbottsford, BC, V2S 4N2 CANADA, vanderburghs@ucfv.bc.ca

Jim Phipps, Department of Geology, Grays Harbor College, Aberdeen, WA 98520-7599, USA, jphipps@ghc.ctc.edu

Several ground penetrating radar (GPR) datasets that were requested by the participants of the research group were collected during the summer of 1998. 100 MHz topographically corrected GPR lines were surveyed to fill in gaps of previous data collection (1996 and 1997), particularly in the north section of the Columbia River Littoral Cell. The northern lines confirmed our hypothesis that deposition in the northern portion of the cell has not been occurring for long period (as compared to lower portions of the cell).

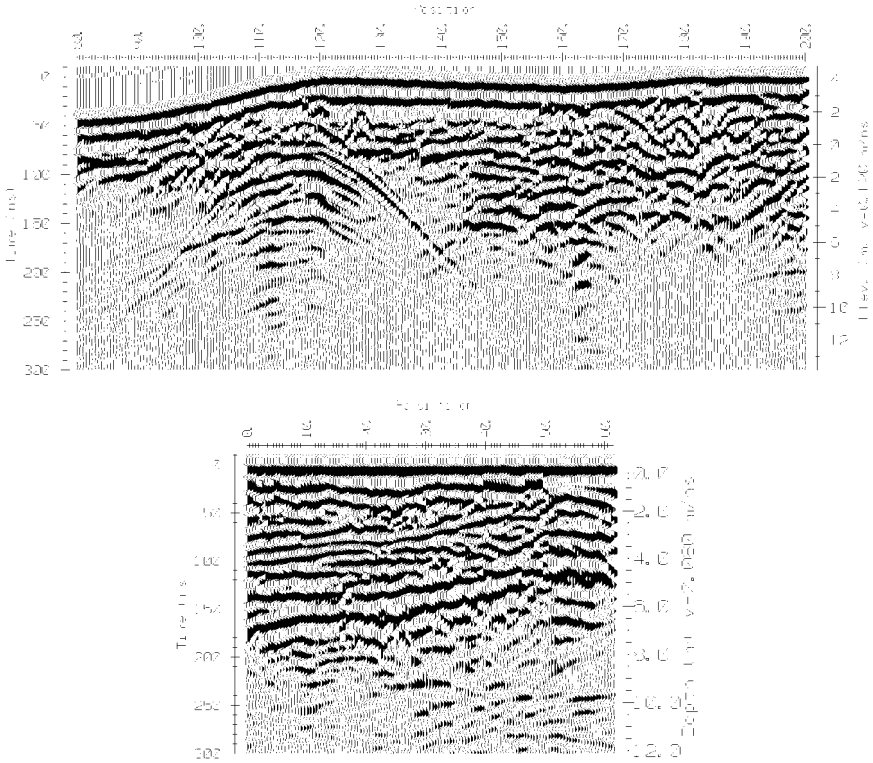

Figure 1 *Upper:* 100 MHz GPR line shot in Moclips – northern portion of the cell. Paleo-scarp located at 100-110 m. *Lower:* 100 MHz GPR line shot as a continuation of a 1997 line to confirm paleo-beach cliff location and lower Holocene – Pleistocene contact (35-55 m)

Field experiments that compared radar frequencies and transmitter powers were carried out at several locations within the cell. Antennae frequencies tested were 25, 50, 100 and 200 MHz. The transmitter powers used were 400 and 1000 volt (maximum allowable by federal government regulations). All lines were topographically corrected. The experiment allowed for both higher resolution datasets to be collected so that better insight into the sedimentological structures could be achieved, as well as deeper penetration, particularly into the large dunes of the Clatsop area of the study.

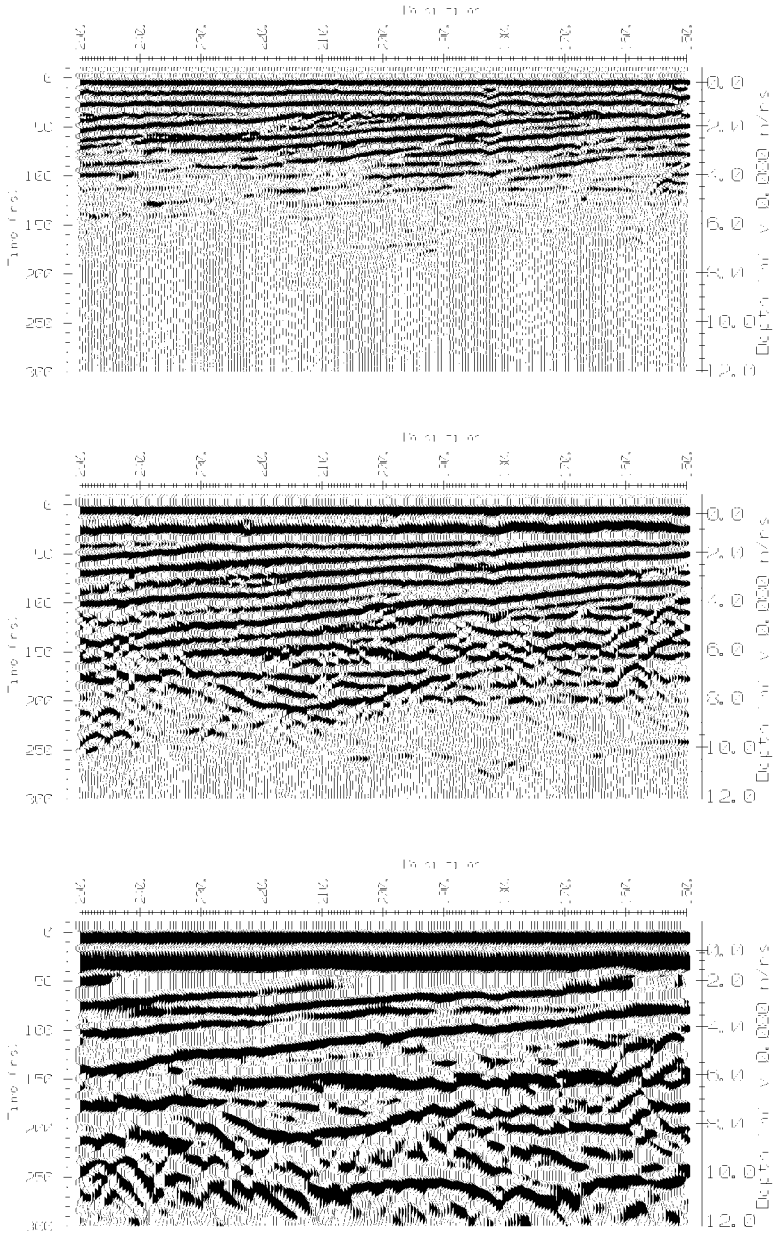

Figure 2 A frequency comparison of 3 GPR antennae frequencies. The site was located on the south end of Ocean Shores. The profiles are plotted with similar parameters. *Upper:* 200 MHz antennae – note higher resolution stratigraphy, *Middle:* 100 MHz antennae – note deeper penetration and lower resolution, *Lower:* 50 MHz antennae – note much deeper penetration (off this scale) but a loss of much of the near surface stratigraphy.

Two three-dimensional grids were collected, one in the North Grays Harbor area and one in the Long Beach area. The datasets were collected to image recent paleo-beachface (shoreface) deposits and compare the results to present beachfaces. A GPS grid was collected at the same time as the high resolution (200 MHz) GPR grid was collected. The dimension of the grid was 25 m by 25 m with datapoints collected every 0.5 m (0.5 m antennae step along lines separated by 0.5 m). Initial processing and interpretation reveals several paleo-beach layers that will be compared to the present GPS beachface surveys.

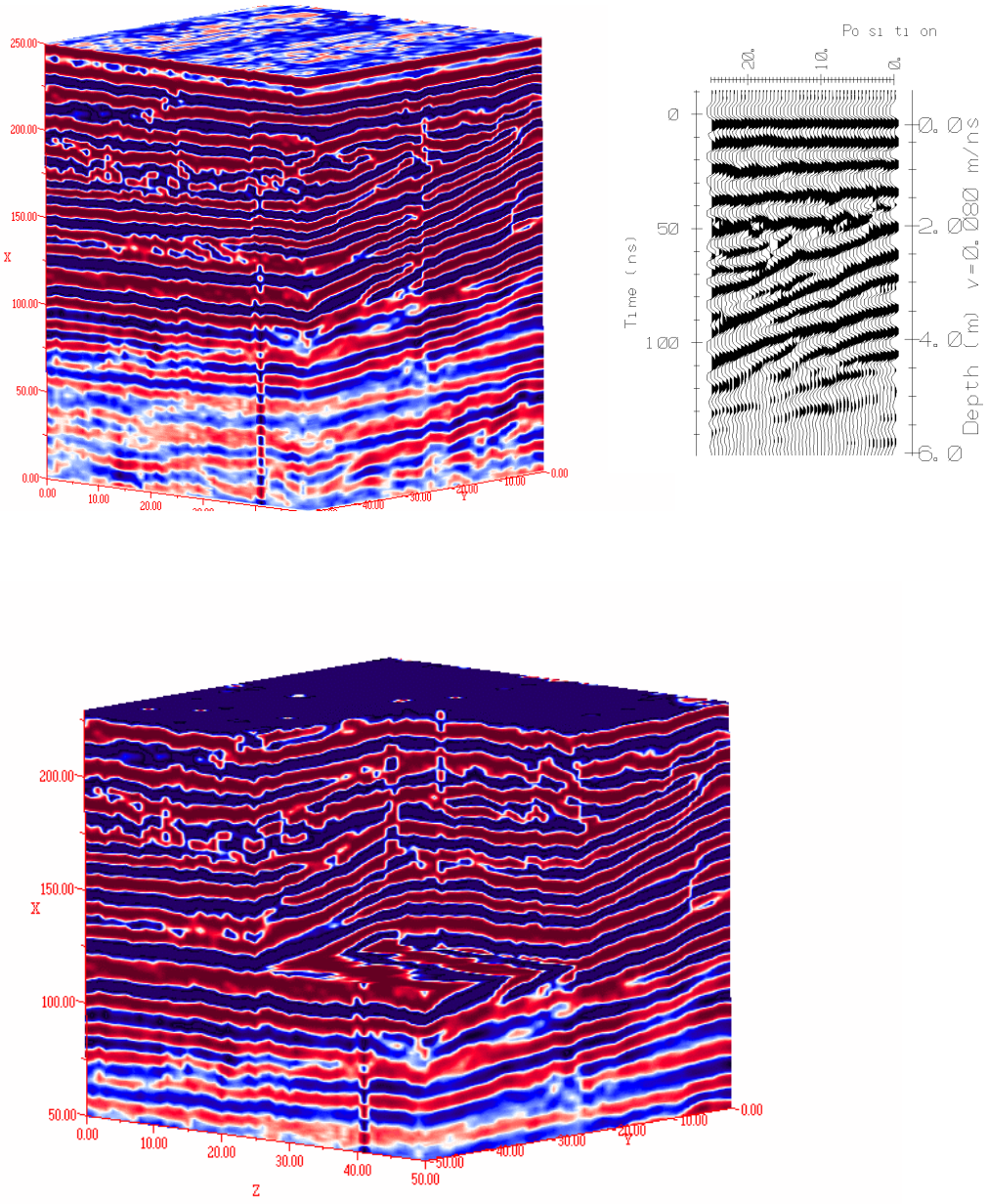

Figure 2 200 MHz 3D Grid shot to map paleo-beachfaces. Grid shown is located in the Long Beach portion of the cell. *Upper Left:* Three dimensional perspective of the dataset (red lines indicating shorefaces). *Upper Right:* One of the 51 GPR lines shot – each dipping reflection is interpreted as a paleo-beachface, *Lower:* The cube shown here has been cut away to show the internal stratigraphy of the shoreface. Note the continuity of the beachfaces.

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